

REMARKS

This is a full and timely response to the non-final Official Action mailed **June 30, 2008** (the “Office Action” or “Action”). Reconsideration of the application in light of the above amendments and the following remarks is respectfully requested.

Claim Status:

Under a previous Restriction Requirement, claims 2-5, 8, 9, 12, 13, and 16-57 were withdrawn from consideration. Applicant will be entitled to rejoinder of at least some of these withdrawn claims upon the allowance of, for example, claim 1. *See* MPEP § 821.04

No amendments to the claims are proposed by the present paper. Claims 1, 6, 7, 10, 11, 14 and 15 are now pending for further action.

Prior Art:

With respect to the prior art, claim 1 was rejected under 35 U.S.C. § 103(a) as obvious in view of the combined teachings of U.S. Patent No. 6,727,522 to Kawasaki U.S. Patent No. 4,641,167 to Nishizawa (“Nishizawa”). For at least the following reasons, this rejection should be reconsidered and withdrawn for at least the following reasons.

Claim 1 recites:

A semiconductor device, comprising:
a drain electrode;
a source electrode;
a channel contacting the drain electrode and the source electrode, *wherein the channel includes one or more of a metal oxide including zinc-germanium, zinc-lead, cadmium-germanium, cadmium-tin, or cadmium-lead*; and
a gate dielectric positioned between a gate electrode and the channel.
(Emphasis added).

Applicant notes that claim 1 recites a semiconductor device in which the channel includes one or more *metal oxides*, specifically including at least one of “zinc-germanium, zinc-lead, cadmium-germanium, cadmium-tin, or cadmium-lead.” Applicant’s specification supports this subject matter by stating the following. “Exemplary embodiments include semiconductor devices that contain a multicomponent channel including ... a two-component oxide formed of a zinc-germanium oxide, zinc-lead oxide, cadmium-germanium oxide, cadmium-tin oxide, cadmium-lead oxide.” (Applicant’s specification, p. 1, line 29 to p. 2, line 4).

In contrast, neither of the cited prior art references teach or suggest the claimed semiconductor device comprising a channel including an oxide from the following list: “zinc-germanium, zinc-lead, cadmium-germanium, cadmium-tin, or cadmium-lead.” This subject matter is entirely outside the scope and content of the cited prior art.

According to the Action, Kawasaki teaches a “channel 11 [that] includes one or more of a metal oxide including zinc magnesium oxide $\text{Mg}_x\text{Zn}_{1-x}\text{O}$, zinc cadmium oxide $\text{Cd}_x\text{Zn}_{1-x}\text{O}$.” (Action, p. 2). This, however, is utterly irrelevant because zinc magnesium oxide and zinc cadmium oxide are not among the oxides recited in claim 1. Consequently, Kawasaki clearly fails to teach or suggest the claimed channel including one or more metal oxides from the list including “zinc-germanium, zinc-lead, cadmium-germanium, cadmium-tin, or cadmium-lead.”

The Office Action does concede that “Kawasaki et al. do not disclose the channel including zinc-germanium.” (Action, p. 3). Consequently, the Action cites to Nishizawa at col. 3, lines 13-23. (*Id.*). According to the Action, this portion of Nishizawa teaches a “channel including zinc-germanium.” (*Id.*). This is clearly incorrect.

The cited portion of Nishizawa states the following.

Those regions of the layer 2 and 4 which will form the channel are doped with an impurity atom which is excited by infrared or far infrared light. The hatched region 9 indicates that region. The region to be doped with the impurity element which is excited by the infrared or far infrared light is selected in accordance with the region of wavelength of light to be detected, and the thickness of the region to be doped may be about the penetration depth of the infrared or far infrared light. Such an impurity element may preferably be gold, mercury, zinc or the like in the case of a germanium substrate and gold or the like in the case of a silicon substrate.

(Nishizawa, col. 3, lines 13-23).

Thus, Nishizawa teaches a channel region formed in a germanium or silicon substrate that is doped with an impurity such as gold, mercury, zinc or the like. Thus, among the possibilities taught by Nishizawa is a germanium substrate doped with zinc. This, however, is not a teaching or suggestion of a zinc-germanium or, more relevantly, a zinc-germanium oxide, as the Action seems to conclude.

Nishizawa clearly does not teach, suggest or even mention a metal oxide used to form the channel. Doping a germanium substrate with zinc produces zinc molecules embedded in germanium. Doping a germanium substrate with zinc does not produce a chemical reaction resulting in zinc-germanium or a zinc-germanium oxide as recited as one of the options in claim 1.

The Action fails to address how a zinc-doped germanium substrate comes to include a zinc-germanium oxide as in claim 1. Consequently, when claim 1 is properly understood, it is clear that neither Kawasaki nor Nishizawa teaches or suggests the claimed channel including one of the expressly listed metal oxides of claim 1.

Under the analysis required by *Graham v. John Deere*, 383 U.S. 1 (1966) to support a rejection under § 103, the scope and content of the prior art must first be determined, followed by an assessment of the differences between the prior art and the claim at issue in view of the ordinary skill in the art. In the present case, the scope and content of the prior art,

as evidenced by Kawasaki and Nishizawa, did not include the claimed subject matter, particularly “a channel contacting the drain electrode and the source electrode, *wherein the channel includes one or more of a metal oxide including zinc-germanium, zinc-lead, cadmium-germanium, cadmium-tin, or cadmium-lead.*” Neither of the cited references teach or suggest a channel comprising any of the listed metal oxides.

The differences between the cited prior art and the claimed subject matter are significant because the claimed subject matter provides features and advantages not known or available in the cited prior art. Consequently, the cited prior art will not support a rejection of claim 1 under 35 U.S.C. § 103 and *Graham*. Therefore, for at least the reasons explained here, the rejection based on Kawasaki and Nishizawa of claim 1 should be reconsidered and withdrawn.

No rejection based on prior art was made as to any claim other than claim 1.

Conclusion:

In view of the foregoing arguments, all claims are believed to be in condition for allowance over the prior art of record. Therefore, this response is believed to be a complete response to the Office Action. However, Applicant reserves the right to set forth further arguments in future papers supporting the patentability of any of the claims, including the separate patentability of the dependent claims not explicitly addressed herein. In addition, because the arguments made above may not be exhaustive, there may be reasons for patentability of any or all pending claims (or other claims) that have not been expressed.

The absence of a reply to a specific rejection, issue or comment in the Office Action does not signify agreement with or concession of that rejection, issue or comment. Finally,

nothing in this paper should be construed as an intent to concede any issue with regard to any claim, except as specifically stated in this paper, and the amendment of any claim does not necessarily signify concession of unpatentability of the claim prior to its amendment. Further, for any instances in which the Examiner took Official Notice in the Office Action, Applicants expressly do not acquiesce to the taking of Official Notice, and respectfully request that the Examiner provide an affidavit to support the Official Notice taken in the next Office Action, as required by 37 CFR 1.104(d)(2) and MPEP § 2144.03.

If the Examiner has any comments or suggestions which could place this application in better form, the Examiner is requested to telephone the undersigned attorney at the number listed below.

Respectfully submitted,

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